

(12) **UK Patent Application** (19) **GB** (11) **2 366 727** (13) **A**

(43) Date of A Publication 20.03.2002

(21) Application No 0115701.5

(22) Date of Filing 27.06.2001

(30) Priority Data

(31) 10032118

(32) 01.07.2000

(33) DE

(51) INT CL<sup>7</sup>

A61K 7/11

(52) UK CL (Edition T )

A5B BFC

U1S S1343

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(56) Documents Cited

GB 2134784 A

US 4839166 A

US 4804705 A

US 4240450 A

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(58) Field of Search

UK CL (Edition T ) A5B BFC

INT CL<sup>7</sup> A61K 7/06 7/11

Online: PAJ, EPODOC, WPI, TXTE, CAS-ONLINE

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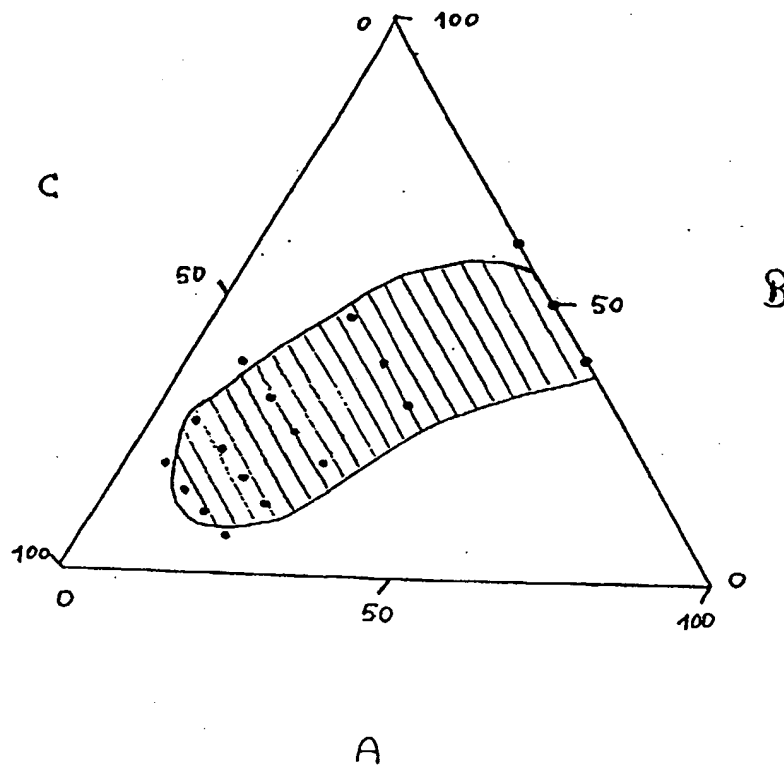
(54) Abstract Title

**Antithixotropic cosmetic agents**

(57) Cosmetic agents for the treatment of the skin or hair which exhibit an antithixotropic (rheopectic) rheological behaviour. The agents preferably contain a polymer combination of at least one anionic polymer, at least one cationic polymer and optionally, for improved ability to be distributed, at least one modified starch in a quantitative ratio which is so selected that the agent exhibits antithixotropic behaviour. Suitable anionic polymers have acid groups and include polystyrene sulfonates. Suitable cationic polymers have nitrogen-containing groups.

GB 2 366 727 1

1/1



**Antithixotropic cosmetic agent**

The present invention relates to a cosmetic agent having antithixotropic (rheopectic) properties for the treatment of the skin or hair. The viscosity of the agent increases during the period of action of a shearing stress which remains constant.

The application properties of cosmetic agents are greatly influenced by their flow behaviour, that is to say, by their rheological properties. Often the cosmetic agents are used in the form of thickened, viscous compositions, for example shower or hair gels, thickened lotions, creams, etc.. As a rule, such agents have the properties of non-Newtonian fluids, especially the properties of pseudoplastic fluids with or without a flow limit. In that case, the viscosity decreases as the shearing rate increases (shear thinning) and the flow curve is not linear, that is to say, the ratio of the shearing stress to the shearing rate is not constant. In practice, this makes itself felt in that a gel in the resting phase has a relatively high viscosity, or exhibits plastic behaviour, but becomes flowable as a result of the application of relatively low forces and can therefore, for example, be removed from the packaging easily and can be easily rubbed with the hands and easily distributed on the skin or the hair. In many cases such cosmetic agents also exhibit thixotropic behaviour, which is understood to mean a reduction in viscosity while the shearing stress remains constant. In terms of measuring techniques, this makes itself felt by the occurrence of a rheological hysteresis: when the shearing rate is increased from zero to a maximum value and is then reduced to zero again, two non-coinciding flow curves are obtained, the first partial curve lying above the second partial curve.

The disadvantage of conventional viscous cosmetic agents resides in the fact that, after manual application to vertical or sloping skin or hair surfaces, the viscosity may decrease continuously owing to the shearing stress caused by the specific weight of the agent, the agent running off the surface in an undesirable manner, and even at an increasing rate in the case of thixotropic behaviour.

The problem of the present invention was to avoid the rheological disadvantages of known cosmetic compositions and to provide novel cosmetic agents having novel attractive haptic properties. In particular, the object was to provide a cosmetic product having rubber-like pronounced visco-elastic properties. This means that, in addition to the usual cosmetic properties, when the product is removed, for example, from jar-like or can-like packaging, a fun presentation effect is permitted, giving the product a unique quality.

The problem is solved by a cosmetic agent for the treatment of the skin or hair, which agent exhibits antithixotropic (rheoplectic) behaviour. The terms antithixotropy and rheopexy are often used synonymously. Antithixotropy (rheopexy) in the sense of the present invention means the increase in viscosity under isothermal conditions during the action of a constant shearing stress (shearing rate). Agents that exhibit antithixotropic behaviour at at least one shearing rate (preferably in the range of from 1 to 100 s<sup>-1</sup>, measured using a Haake VT-550 rheometer, measuring cylinder SV-DIN at 25°C) are according to the invention. If, under isothermal conditions, the shearing rate is increased at a linear rate from zero to a maximum value (for example 100 s<sup>-1</sup>) and then reduced to zero again in the same manner, a

hysteresis results for the flow curve such that the first partial curve lies completely or partially below the second partial curve. Agents in the case of which the partial curves intersect are referred to hereinafter as partially antithixotropic and are likewise according to the invention.

A cosmetic agent according to the invention can be prepared by using a polymer combination of

(A) at least one anionic polymer and

(B) at least one cationic polymer

in an aqueous, alcoholic or aqueous-alcoholic medium, the type and amount of the polymers being so selected that they confer antithixotropic (rheopectic) behaviour on the agent. Apart from antithixotropic or partially antithixotropic behaviour, the agents also exhibit a reduction in viscosity as the shearing rate increases (shear thinning).

Polymers (A) and (B) are preferably film-forming polymers and especially preferably polymers that have both film-forming properties and hair-setting or hair-care properties. Such systems are especially suitable for hair-treatment agents, it being possible greatly to reduce or entirely to dispense with a content of conventional thickeners or gel-formers and additional hair-setting or hair-care polymers. The expression "film-forming polymers" is to be understood to mean polymers that are capable of depositing a polymer film on hair.

The concentration of the anionic polymers (A) is preferably from 0.01 to 20% by weight, especially preferably from 0.1 to 10% by weight, and very especially preferably from 0.2 to 2% by weight. The concentration of the cationic polymers (B) is preferably from 0.01 to 20% by weight, especially

preferably from 0.1 to 10% by weight and very especially preferably from 0.4 to 2% by weight.

The agent according to the invention may additionally contain at least one modified starch (C) in an amount of up to 20% by weight, preferably from 0.1 to 10% by weight, and especially preferably from 0.5 to 5% by weight, in order to improve its ability to be distributed on the skin or in order to improve its ability to be worked into the hair.

#### Anionic polymer (A)

Suitable anionic polymers (A) are homo- or copolymers having monomer units that contain acid groups and that are optionally copolymerised with comonomers that do not contain acid groups. The acid groups are preferably selected from  $-\text{COOH}$ ,  $-\text{SO}_3\text{H}$ ,  $-\text{OSO}_3\text{H}$ ,  $-\text{OPO}_2\text{H}$  and  $-\text{OPO}_3\text{H}_2$ , of which the carboxylic acid groups are preferred. Preferably, from 50 to 100% of the acid groups are in anionic or neutralised form. Organic or inorganic bases suitable for cosmetic purposes may be used as neutralising agents. Examples of bases are amino alcohols, such as, for example, aminomethyl propanol (AMP), triethanolamine, monoethanolamine or tetrahydroxypropylethylenediamine and ammonia,  $\text{NaOH}$  and others. Suitable monomers are unsaturated, radically polymerisable compounds that carry at least one acid group, especially carboxyvinyl monomers. Suitable monomers containing acid groups are, for example, acrylic acid, methacrylic acid, crotonic acid, maleic acid or maleic anhydride or the monoesters thereof, aldehydocarboxylic acids or ketocarboxylic acids.

Comonomers not substituted by acid groups are, for example, acrylamide, methacrylamide, alkyl- and dialkylacrylamide, alkyl- and dialkylmethacrylamide, alkyl acrylate, alkyl

methacrylate, vinylcaprolactone, vinylpyrrolidone, vinyl ester, vinyl alcohol, propylene glycol or ethylene glycol, amine-substituted vinyl monomers, such as, for example, dialkylaminoalkyl acrylate, dialkylaminoalkyl methacrylate, monoalkylaminoalkyl acrylate and monoalkylaminoalkyl methacrylate, the alkyl groups of those monomers preferably being C1 to C20 alkyl groups, especially preferably C1 to C7 alkyl groups.

Preferred polymers having acid groups are especially copolymers of acrylic acid or methacrylic acid with monomers selected from acrylic or methacrylic acid esters, acrylamides, methacrylamides and vinylpyrrolidone, homopolymers of crotonic acid and copolymers of crotonic acid with monomers selected from vinyl esters, acrylic or methacrylic acid esters, acrylamides and methacrylamides.

Especially preferred polymers having acid groups are: cross-linked or non-crosslinked vinyl acetate/crotonic acid copolymers (INCI: VA/crotonates copolymer), for example Resyn 28-1310 of National Starch or Luviset® CA 66 of BASF; terpolymers of vinyl acetate, crotonate and vinyl alkanoate, especially vinyl acetate/crotonate/vinyl neodecanoate copolymers (INCI: VA/crotonates/vinyl neodecanoate copolymer), for example Resyn 28-2930 of National Starch; partially esterified copolymers of vinyl methyl ether and maleic anhydride (INCI: ethyl, isopropyl, butyl esters of PVM/MA copolymer), for example Gantrez® ES 225 or Gantrez® ES 425 of ISP; copolymers of acrylic acid or methacrylic acid with alkyl acrylates and/or N-alkylacrylamides, especially copolymers of methacrylic acid and alkyl acrylates and terpolymers of acrylic acid, alkyl acrylates and N-alkylacrylamides, such as acrylic acid/ethyl acrylate/N-tert.-butylacrylamide terpolymer (INCI:

acrylate/acrylamide copolymer), for example Ultrahold® 8 of BASF or tert.-butyl acrylate/ethyl acrylate/methacrylic acid terpolymer (INCI: acrylates copolymer), for example Luvimer® of BASF; polystyrene sulphonates (INCI: sodium polystyrene sulfonate), for example Flexan® 130 of National Starch. The best results were achieved with polystyrene sulphonates.

#### Cationic polymer (B)

Suitable cationic polymers (B) are polymers having cationic or basic, that is to say, cationisable groups. Those polymers contain nitrogen-containing groups, such as, for example, primary, secondary, tertiary or preferably quaternary amines. The cationic or cationisable group is contained either in the polymer chain or preferably as a substituent on one or more monomers. The cationic polymer may be a natural or a synthetic homo- or copolymer having amine- or ammonium-substituted monomer units and optionally having non-basic and non-cationic comonomers. Suitable polymers having basic groups are, for example, copolymers of amine-substituted vinyl monomers and non-amine-substituted, non-cationic monomers. Amine-substituted vinyl monomers are, for example, dialkylaminoalkyl acrylate, dialkylaminoalkyl methacrylate, monoalkylaminoalkyl acrylate and monoalkylaminoalkyl methacrylate, the alkyl groups of those monomers preferably being lower alkyl groups, such as, for example, C1 to C7 alkyl groups, especially preferably C1 to C3 alkyl groups.

Suitable ammonium-substituted vinyl monomers are, for example, trialkylmethacryloxyalkylammonium, trialkylacryloxyalkylammonium, dialkyldiallylammonium and quaternary vinylammonium monomers having cyclic groups containing cationic nitrogens, such as pyridinium or imidazolium, for



example alkylvinylpyridinium or alkylvinylimidazolium salts. The alkyl groups of those monomers are preferably lower alkyl groups, such as, for example, C1 to C7 alkyl groups, especially preferably C1 to C3 alkyl groups. Suitable polymers having quaternary amine groups are, for example, the polymers described in the CTFA Cosmetic Ingredient Dictionary under the name polyquaternium, such as quaternised copolymers of vinylimidazole, vinylpyrrolidone and/or vinylcaprolactam (polyquaternium-16, -44 or -46), quaternised vinylpyrrolidone/dimethylaminoethyl methacrylate copolymer (polyquaternium-11), homo- and copolymers of dimethyldiallylammonium chloride (polyquaternium-6, -7 or -22), quaternised hydroxyethylcellulose (polyquaternium-10) or quaternised guar derivatives.

Non-amine-substituted, non-cationic comonomers are, for example, acrylamide, methacrylamide, alkyl- and dialkylacrylamide, alkyl- and dialkylmethacrylamide, alkyl acrylate, alkyl methacrylate, vinylcaprolactone, vinylpyrrolidone, vinyl ester, vinyl alcohol, maleic anhydride, propylene glycol or ethylene glycol, the alkyl groups of those monomers preferably being C1 to C7 alkyl groups, especially preferably C1 to C3 alkyl groups.

Especially preferred cationic polymers (B) are: quaternised vinylpyrrolidone/dialkylaminoalkyl methacrylate copolymers, especially quaternised vinylpyrrolidone/dimethylaminoethyl methacrylate copolymer (INCI: polyquaternium-11), for example Gafquat® 755 of ISP or Luviquat® PQ11 of BASF; methylvinylimidazolium chloride/vinylpyrrolidone copolymer (INCI: polyquaternium-16), for example the Luviquat® types FC 370, FC 550, FC 905 or HM 552 of BASF; methylvinylimidazolium methyl sulphate/vinylpyrrolidone copolymer (INCI: polyquaternium-44, for example Luviquat® Care or Luviquat®

MS 370 of BASF; or the copolymer of vinylcaprolactam, vinylpyrrolidone and quaternised vinylimidazole (INCI: polyquaternium-46), for example Luviquat® Hold of BASF.

#### Modified starch (C)

Suitable modified starches are physically or chemically modified starches or starch derivatives, such as starch esters (for example acetylated starches), starch ethers (for example hydroxyalkylated starches), dialdehyde starches, dicarboxyl starches, distarch phosphates, hydroxyalkyl starch phosphates or hydroxyalkyl starches, the alkyl groups preferably containing from 1 to 4, especially preferably 2 or 3 carbon atoms. Also suitable are crosslinked starch ethers, for example those having the INCI names dimethylimidazolidinone rice or corn starch, or hydrophobically modified starches, such as those having the INCI name aluminium starch octenylsuccinate. The starch may be thermally, hydrolytically or enzymatically decomposed. The starting starch may be obtained from the known sources, for example from corn, potatoes, sweet potatoes, peas, bananas, oats, wheat, barley, rice, sago, tapioca, arrowroot, amaranth, canna, sorghum, etc.. Non-ionic starch derivatives are preferred. Suitable non-ionic derivatisation agents are, especially, alkylene oxides, such as ethylene oxide, propylene oxide or butylene oxide, acetic anhydride or butylketene dimer. The alkylene oxides, especially propylene oxide, are especially preferred. Such non-ionically derivatised starch derivatives and the manufacture thereof are known per se.

Especially preferred starch derivatives (C) are:  
modified corn starch (INCI: corn starch modified), for example Amaze® of National Starch; modified potato starch (INCI: potato starch modified), for example Solanace® of

National Starch or hydroxyalkylated distarch phosphate (INCI: hydroxypropyl starch phosphate), for example Structure ZEA of National Starch.

The triangular diagram of Figure 1/1 can be used to select suitable quantitative ratios of polymers (A), (B) and (C). Antithixotropic systems are obtained in particular when, in the agent according to the invention, a polymer combination is used in which the ratio of polymers (A), (B) and (C) is so selected that it falls within the hatched region of the triangular diagram. The triangular diagram shows the mixing ratios of the polymers, based on 100% solid content. The sides of the triangle carry the percentage proportion of the particular type of polymer in the total amount of the polymer combination based on the sum of the solid contents of the polymers. Cosmetic agents that were not according to the invention and that had thixotropic behaviour were obtained with the indicated polymer combinations outside the hatched region. Antithixotropic systems are obtained especially with the following proportions of polymers (A), (B) and (C) in the total amount of polymer:

Polymer (A) in an amount of from 5 to 65, preferably from 10 to 55% by weight, polymer (B) in an amount of from 8 to 60, preferably from 10 to 55% by weight and polymer (C) in an amount of from 0 to 75, preferably from 10 to 70% by weight, the quantitative data being based in each case on the total amount of polymers  $(A)+(B)+(C) = 100\%$  by weight.

The agent according to the invention is preferably manufactured in an aqueous, an alcoholic or in an aqueous-alcoholic medium with preferably at least 10% by weight, especially preferably at least 70% by weight of water and preferably a maximum of 40% by weight of ethanol. In particular, the lower monohydric alcohols having from 1 to 4 carbon atoms,

such as, for example, ethanol and isopropanol, which are normally used for cosmetic purposes may be present as alcohols. The agent according to the invention may be in a pH range of from 2.0 to 9.5. The pH range from 5 to 8 is especially preferred. Organic solvents or a mixture of solvents having a boiling point below 400°C may be present in an amount of from 0.1 to 15% by weight, preferably from 1 to 10% by weight, as additional co-solvents. Polyhydric C2 to C5 alcohols, such as glycerol, ethylene glycol and propylene glycol, in an amount of up to 20% by weight are especially suitable as additional co-solvents.

The agent according to the invention may also contain further additive constituents usual for hair-treatment agents, for example cationic combability enhancers, cosmetic oils and waxes, silicone oils, fatty alcohols, fatty acid esters, fatty acid glycerides, perfume oils, surfactants and emulsifiers, complexing agents, pH buffer substances, colouring dyes, pearl lustre agents, opacifiers, humectants, light-screening agents, antioxidants, gloss imparters and preservatives. The additives are preferably present in an amount of from 0.01 to 10% by weight in each case, the total amount of the additives generally not exceeding 20% by weight.

Optionally, conventional thickening agents may also be added in order to optimise the properties of the product mass although this is not absolutely necessary to achieve the gel-like character with antithixotropic properties.

The agent according to the invention is preferably used for hair treatment. It can then be used in various forms of application, for example in the form of hair-care, hair-setting, hair-dyeing or hair-tinting agents. Application as

a leave-in product in the form of a hair gel, which does not have to be rinsed out, is especially preferred. The viscosity of the gel is preferably from 100 to 100,000, especially preferably from 500 to 50,000 mPa s, and very especially preferably from 1,000 to 15,000 mPa s, measured as a dynamic viscosity measurement with a HAAKE VT-550 rheometer, measuring cylinder SV-DIN, at a temperature of 25°C and a shearing rate of 50 s<sup>-1</sup>.

If the agent according to the invention is used in the form of a hair-tinting agent, it additionally contains from 0.05 to 2.0% by weight of at least one direct-acting hair dye which may be selected, for example, from the following classes of direct-acting hair dyes: aromatic nitro dyes, for example, 1,4-diamino-2-nitrobenzene; azo dyes, for example Acid Brown 4 (C.I. 14805); anthraquinone dyes, for example Disperse Violet 4 (C.I. 61 105); triphenylmethane dyes, for example Basic Violet 1 (C.I. 42535); the dyes may be of an acidic, nonionic or basic character depending on the nature of their substituents. Natural dyes, such as, for example, red henna or black henna, may also be used.

If the cosmetic agent according to the invention is used for hair care or hair-setting, it is applied in the following manner: depending on the fullness of the hair, from 5 to 30 g of the agent are distributed in the dry hair or, after the hair has been washed, in the towel-dried hair. The hair is then combed out, shaped in a style and optionally dried.

The preparation of the agent can be carried out with conventional mixing and agitating apparatus. In the first step, the polymer mixture is dissolved in water. Then all the other components are added.

The agent according to the invention is distinguished by its special rheological properties which manifest themselves especially in an attractive, rubber-like elastic outer appearance with an especially appealing haptic quality. The agent can be removed from packaging in the form of a jar or a can simply and without leaving residues, unlike conventional gels packed in tubes. The gels can be pulled off normally without any of it running down. A preferred product is therefore a combination of the composition according to the invention and packaging in the form of a jar or a can. Despite the rubber-like elastic consistency, the agent can be distributed well on the skin or hair, especially if it contains modified starches. As a hair-treatment agent it does not stress the hair and is therefore also especially suitable for fine hair. As a hair-setting agent, it gives the style good holdability without the hair becoming stuck together or being stressed by a large portion of setting polymers. Fine hair is given fullness and volume. As a hair-setting gel, the hair-treatment agent exhibits better setting properties than do conventional gels.

The following Examples are intended to illustrate the subject-matter of the invention in more detail.

### Examples

#### Example 1: Antithixotropic and thixotropic compositions

Aqueous compositions having the polymer contents indicated in Table 1 were prepared.

Table 1: Compositions investigated

No.	Polymer A	Polymer B	Polymer C	Rheology
1	0.3	1	4	Thixotropic
2	0.6	0.8	4	Antithixotropic
3	0.9	0.6	4	Antithixotropic
4	1.2	0.4	4	Thixotropic
5	0.3	1.2	3	Antithixotropic
6	0.6	1	3	Antithixotropic
7	0.9	0.8	3	Antithixotropic
8	1.2	0.6	3	Antithixotropic
9	0.3	1.4	2	Thixotropic
10	0.6	1.2	2	Antithixotropic
11	0.9	1	2	Antithixotropic
12	1.2	0.8	2	Antithixotropic
13	0.6	1.4	1	Antithixotropic
14	0.9	1.2	1	Antithixotropic
15	1.2	1	1	Antithixotropic
16	0.9	1.4	0	Thixotropic
17	1.2	1.2	0	Antithixotropic
18	1.5	1	0	Antithixotropic

The quantitative data relate to the solid content in grams based on 100 g total composition.

Polymer A: Flexan® 130 (sodium polystyrene sulphonate, 30% in water)

Polymer B: Gafquat® 755 (polyquaternium-11, vinylpyrrolidone/dimethylaminoethyl methacrylate methosulphate copolymer, 20% in water)

Polymer C: Structure Solanace® (modified potato starch).

The rheological behaviour of those compositions was investigated by measuring the dependence of the shearing stress, or the viscosity, on the shearing rate.

Measuring apparatus: Haake VT-550 rheometer; measuring cylinder SV-DIN

Temperature: 25°C;

Shearing rate of from 0 to 100 s<sup>-1</sup>

measured upwards and downwards.

The compositions characterised as being antithixotropic are according to the invention and exhibit antithixotropic behaviour. The flow curve recorded at an increasing shearing rate lies entirely or at least partially below the flow curve recorded at a decreasing shearing rate. The compositions according to the invention are all within the hatched region of the triangular diagram shown in Figure 1/1. The triangular diagram shows the mixing ratios of the solid polymers with one another, based on 100% solid content.

Compositions 1, 4, 9 and 16 are not according to the invention and exhibit thixotropic behaviour. The flow curve recorded at an increasing shearing rate lies entirely above the flow curve recorded at a decreasing shearing rate. The compositions that are not according to the invention are all outside the hatched region of the triangular diagram shown in Figure 1/1.

**Example 2:** Extra strong-setting, highly viscous gel

1.50 g	modified corn starch (Amaze®, National Starch)
3.00 g	Flexan® 130, sodium polystyrene sulphonate, 30% in water
3.50 g	polyquaternium-11
0.10 g	FD&C Yellow No. 10 (1% solution)
0.40 g	Cremophor® RH 410, PEG-40 hydrogenated castor oil, 90% in water
0.15 g	perfume oil
ad 100 g	water, fully demineralised



**Example 3: Gel with strong hold**

3.00 g modified corn starch (Amaze®, National Starch)  
1.25 g Flexan® 130, sodium polystyrene sulphonate, 30%  
in water  
2.50 g polyquaternium-11  
0.40 g PPG-1-PEG-9-lauryl glycol ether  
0.15 g perfume oil  
ad 100 g water, fully demineralised

**Example 4: Setting agent, low-viscosity**

1.00 g modified corn starch (Amaze®, National Starch)  
1.25 g Flexan® 130, sodium polystyrene sulphonate, 30%  
in water  
1.50 g Gafquat® 755 N (polyquaternium-11)  
0.50 g polyquaternium-16  
0.20 g surfactant 193 (dimethicone copolyol)  
0.10 g perfume oil  
ad 100 g water, fully demineralised

**Example 5: Cream gel, extra strong hold, highly viscous**

2.00 g modified corn starch (Amaze®, National Starch)  
4.00 g Flexan® 130, sodium polystyrene sulphonate, 30%  
in water  
5.00 g polyquaternium-46  
0.50 g Antara® 430, styrene/PVP copolymer, 40% in water  
0.40 g Cremophor® RH 410, PEG-40 hydrogenated castor oil,  
90% in water  
0.30 g surfactant 190 (dimethicone copolyol)  
0.10 g perfume oil  
ad 100 g water, fully demineralised

**Example 6: Gloss and setting gel, highly viscous**

3.00 g modified corn starch (Amaze®, National Starch)  
2.00 g Flexan® 130, sodium polystyrene sulphonate, 30%  
in water  
1.00 g Luviset® CA 66, vinyl acetate/crotonic acid  
copolymer  
3.00 g polyquaternium-46  
0.20 g Merquat® 100, polyquaternium-6, 40% in water  
10.00 g propylene glycol  
0.15 g perfume oil  
ad 100 g water, fully demineralised

**Patent claims**

1. Cosmetic agent for the treatment of the skin or hair, characterised in that it exhibits antithixotropic (rheopectic) behaviour.
2. Agent according to claim 1, characterised in that it contains a polymer combination of
  - (A) at least one anionic polymer and
  - (B) at least one cationic polymerin an aqueous, alcoholic or aqueous-alcoholic medium, the type and amount of the polymers being so selected that they confer antithixotropic (rheopectic) behaviour on the agent.
3. Agent according to claim 2, characterised in that it has a content of a polymer combination of
  - (A) from 0.01 to 20% by weight of at least one film-forming anionic polymer,
  - (B) from 0.01 to 20% by weight of at least one film-forming cationic polymer and
  - (C) from 0 to 20% by weight of at least one modified starch.
4. Agent according to claim 2 or 3, characterised in that the anionic polymer (A) is selected from crosslinked or non-crosslinked vinyl acetate/crotonic acid copolymers, terpolymers of vinyl acetate, crotonate and vinyl alkanoate, partially esterified copolymers of vinyl methyl ether and maleic anhydride, copolymers of acrylic acid or methacrylic acid with alkyl acrylates and/or N-alkylacrylamides and polystyrene sulphonates.
5. Agent according to claim 4, characterised in that the anionic polymer (A) is a polystyrene sulphonate.

6. Agent according to any one of claims 2 to 5, characterised in that the cationic polymer (B) is selected from quaternised vinylpyrrolidone/dialkylaminoalkyl methacrylate copolymers, methylvinylimidazolium chloride/vinylpyrrolidone copolymers, methylvinylimidazolium methyl sulphate/vinylpyrrolidone copolymers and copolymers of vinyl caprolactam, vinylpyrrolidone and quaternised vinylimidazole.
7. Agent according to any one of claims 3 to 6, characterised in that the starch is selected from non-ionically modified starch derivatives.
8. Agent according to any one of claims 3 to 7, characterised in that polymer (A) is present in an amount of from 5 to 65, preferably from 10 to 55% by weight, polymer (B) is present in an amount of from 8 to 60, preferably from 10 to 55% by weight and polymer (C) is present in an amount of from 0 to 75, preferably from 10 to 70% by weight, the quantitative data being based on the total amount of polymers (A), (B) and (C) in each case.
9. Agent according to any one of claims 3 to 8, characterised in that the ratio of polymers (A), (B) and (C) is so selected that it lies within the hatched region of the triangular diagram of Figure 1/1.
10. Agent according to any one of claims 2 to 9, characterised in that polymer (A) is present in an amount of from 0.2 to 2% by weight and polymer (B) is present in an amount of from 0.4 to 2% by weight, the quantitative data being based on the total composition of the agent in each case.
11. Cosmetic agent for the treatment of the skin or hair, having a content of

(A) from 0.01 to 20% by weight of at least one polystyrene sulphonate

(B) from 0.01 to 20% by weight of at least one cationic polymer and

(C) from 0 to 20% by weight of at least one non-ionically modified starch.



INVESTOR IN PEOPLE

Application No: GB 0115701.5  
Claims searched: 1-11

Examiner: Dr Annabel Ovens  
Date of search: 8 January 2002

## Patents Act 1977 Search Report under Section 17

### Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.T): A5B (BFC)

Int Cl (Ed.7): A61K 7/06, 7/11

Other: Online: PAJ, EPODOC, WPI, TXTE, CAS-ONLINE

### Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	GB 2134784 A (L'OREAL) see page 1 lines 15-27 and 49-54 and page 6 lines 45-48	1 at least
X	US 4839166 (GROLLIER ET AL.) see column 2 line 47-column 4 line 25	1 at least
X	US 4804705 (PUM AND SAUTE) see column 1 line 49-column 2 line 59	1 at least
X	US 4240450 (GROLLIER ET AL.) see column 2 lines 20-24, column 4 lines 4-16, column 15 lines 16-19 and column 34 lines 26-40	1 at least

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.